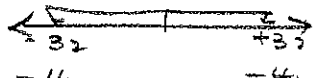
key

Absolute Value Equations & Inequalities Practice

Name:

Solve the Equation

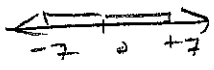
1. $|-4x| = 32$



$-4x = -32$ $-4x = +32$

$x = +8$ $x = -8$ $\{-8, 8\}$

2. $2|3x-2| = 14$



$|3x-2| = 7$

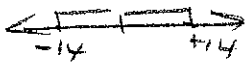
$3x-2=-7$ $+2\ +2$ $\quad 3x-2=+7$ $+2\ +2$

$3x = -5$ $\quad 3x = 9$

$x = -\frac{5}{3}$ $\quad x = 3$ $\left\{-\frac{5}{3}, 3\right\}$

3. $|x+4|+3 = 17$

$|x+4| = 14$



$x+4=-14$ $-4\ -4$ $\quad x+4=+14$ $-4\ -4$

$x = -18$ $\quad x = +10$ $\{-18, 10\}$

4. $-2|2x-3| = 2$

$|2x-3| = -1$

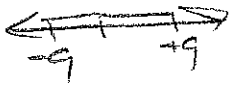
no solution

5. $8-|x+4| = -1$

$-8\quad -8$

$-|x+4| = -9$

$|x+4| = 9$



$x+4=-9$ $-4\ -4$ $\quad x+4=+9$ $-4\ -4$

$x = -13$ $\quad x = 5$ $\{-13, 5\}$

6. $3|4w+1|-5 = 10$

$+5\ +5$

$3|4w+1| = 15$

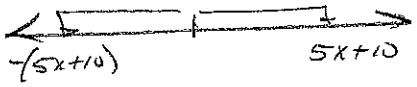
$|4w+1| = 5$

$4w+1=-5$ $-1\ -1$ $\quad 4w+1=+5$ $-1\ -1$

$4w = -6$ $\quad 4w = 4$

$w = -\frac{3}{2}$ $\quad w = 1$ $\left\{-\frac{3}{2}, 1\right\}$

7. $|x-1| = 5x+10$



$x-1 = -5x-10$ $+5x\ \ +5x$

$6x = -9$ $\quad x-1 = 5x+10$ $-x\quad -x$

$x = -\frac{3}{2}$ $\quad -1 = 4x+10$ $-10\quad -10$

$-11 = 4x$

$-\frac{11}{4} = x$ $\left\{-\frac{3}{2}\right\}$

8. $|2x+5| = 3x+4$

$2x+5=-3x-4$ $+3x\quad +3x$

$5x+5=-4$ $-5\quad -5$

$5x = -9$

$x = -\frac{9}{5}$

$2x+5=3x+4$ $-2x\quad -2x$

$5 = x+4$ $-4\quad -4$

$1 = x$ $\{1\}$

9. $\frac{|7p+4|}{8} = 3$

$|7p+4| = 24$

$7p+4=-24$ $-4\ -4$ $\quad 7p+4=+24$ $-4\ -4$

$7p = -28$ $\quad 7p = 20$

$p = -4$ $\quad p = \frac{20}{7}$ $\left\{-4, \frac{20}{7}\right\}$

10. $\frac{2}{3}|3x-6| = 4(x-2)$

$\left(\frac{3}{2}\right)\frac{2}{3}|3x-6| = (4x-8)\frac{3}{2}$

$|3x-6| = 6x-12$

$3x-6=-6x+12$ $+6x\quad +6x$

$9x-6=12$ $+6\quad +6$

$9x = 18$ $\quad x = 2$

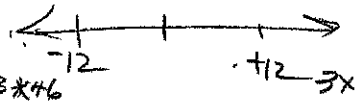
$3x-6=6x-12$ $-3x\quad -3x$

$-6=3x-12$ $+12\quad +12$

$6=3x$ $\quad x=2$

Solve and Graph the Inequality

11. $|3x+6| \geq 12$



$3x+6 \leq -12$ $\quad -6 \quad -6$

$3x \leq -18$

$x \leq -6$

$12 \leq 3x+6$ $\quad -6 \quad -6$

$6 \leq 3x$

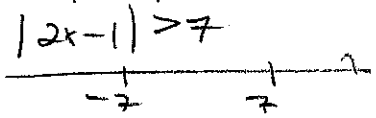
$2 \leq x$

$x \geq 2$

$(-\infty, -6] \cup [2, +\infty)$

12. $3|2x-1| > 21$

$|2x-1| > 7$



$2x-1 < -7$ $\quad +1 \quad +1$

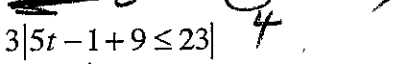
$2x < -6$

$x < -3$

$7 < 2x-1$ $\quad +1 \quad +1$

$8 < 2x$

$4 < x$

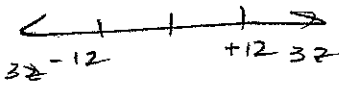


$x > 4$

$(-\infty, -3) \cup (4, +\infty)$

13. $|3z| - 4 > 8$

$|3z| > 12$

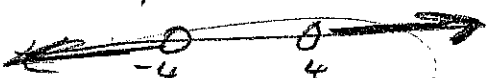


$\frac{3z}{3} < \frac{-12}{3}$

$z < -4$

$12 < 3z$

$4 < z$



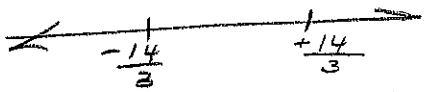
$(-\infty, -4) \cup (4, +\infty)$

14. $3|5t-1+9 \leq 23|$

$3|5t-1| + 9 \leq 23$ $\quad -9 \quad -9$

$3|5t-1| \leq 14$

$|5t-1| \leq \frac{14}{3}$



$5t-1 \leq \frac{14}{3}$ $\quad +1 \quad +1$

$5t \leq \frac{17}{3}$

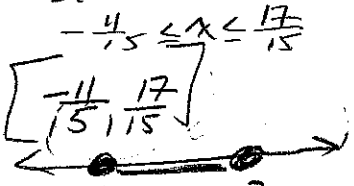
$t \leq \frac{17}{15}$

$-\frac{14}{3} \leq 5t-1$ $\quad +\frac{3}{3} \quad +\frac{3}{3}$

$-\frac{11}{3} \leq 5t$

$-\frac{11}{15} \leq t$

$-\frac{4}{15} \leq x \leq \frac{17}{15}$



$\left[-\frac{11}{15}, \frac{17}{15}\right]$

15. $\frac{1}{4}|x-3| + 2 < 1$ $\quad -2 \quad -2$

$\frac{1}{4}|x-3| < -1$ $\quad (4$

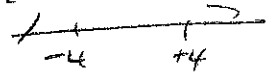
$|x-3| < -4$

no solution

16. $\left|\frac{x-3}{2} + 2 < 6\right|$

$\left|\frac{x-3}{2}\right| + 2 < 6$ $\quad -2 \quad -2$

$\left|\frac{x-3}{2}\right| < 4$



$-4 < \frac{x-3}{2} < 4$

$-8 < x-3 < 8$ $\quad +3 \quad +3$

$-5 < x < 11$

$(-5, 11)$

17. $-2|x+4| < 22$

$|x+4| > -11$

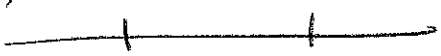
all real #s

$(-\infty, +\infty)$

18. $-2|4t-1| - 6 \leq -20$ $\quad +6 \quad +6$

$-2|4t-1| \leq -14$

$|4t-1| \geq 7$



$4t-1 \leq -7$ $\quad +1 \quad +1$

$4t \leq -6$

$t \leq -\frac{3}{2}$

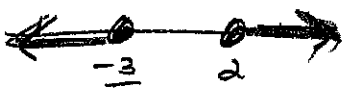
$7 \leq 4t-1$ $\quad +1 \quad +1$

$8 \leq 4t$

$2 \leq t$

$t \geq 2$

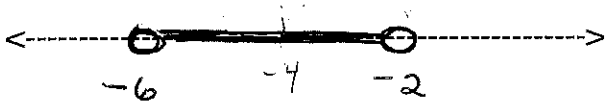
$t \leq -\frac{3}{2} \quad t \geq 2$



$\left(-\infty, -\frac{3}{2}\right] \cup [2, +\infty)$

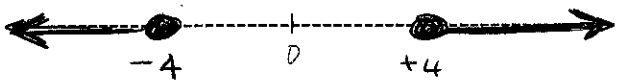
Problem Solving

19. Write an absolute value inequality from the graph.



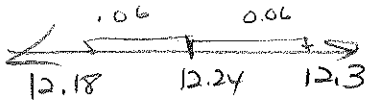
$|x+4| \leq 2$

20. Write an absolute value inequality from the graph.



$|x| \geq 4$

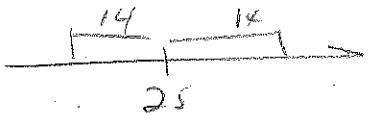
21. The ideal diameter of a gear for a certain type of click is 12.24mm. An actual diameter can vary by 0.06mm. Find the range of acceptable diameters.



$|x - 12.24| \leq 0.06$

Let x = actual diameter

22. A meteorologist reported that the previous day's temperatures varied by 14 degrees from the normal temperature of 25 degrees. What were the maximum and minimum temperatures possible on the previous day? Write an absolute value equation for the temperature.

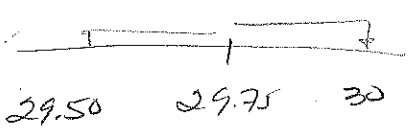


$|x - 25| \leq 14$

Let x = actual temp

minimum of 11°
Maximum of 39°

23. A junior high school basketball should have a circumference of 29.75 inches. The acceptable tolerance is 0.25 inches. Find the acceptable range of the circumference of the basketballs by setting up and solving an absolute value inequality.



$|x - 29.75| \leq 0.25$

Let x = actual Circumference.

$29.5 \leq x \leq 30$ inches

The range is from 29.5 in to 30 in.

Solve for a

24) $2ab + bc = ac$

$-2ab \qquad -2ab$

$bc = ac - 2ab$

$bc = a(c - 2b)$

$\frac{bc}{(c-2b)} = a$

move all terms with a to one side

factor (undistribute) the a

divide both sides by $(c-2b)$

25) $A = \frac{1}{2} h (b_1 + b_2)$

Solve for b_2

$2A = 2\left(\frac{1}{2}\right) h (b_1 + b_2)$

mult by reciprocal to eliminate the $\frac{1}{2}$

$\frac{2A}{h} = \frac{h(b_1 + b_2)}{h}$

divide both sides by h

$\frac{2A}{h} = b_1 + b_2$

$-b_1 \qquad -b_1$

$\frac{2A}{h} - b_1 = b_2$

26)

Solve for y

$$\frac{x}{y} + 3 = 8x$$

$$-3 \quad -3$$

$$\frac{x}{y} = 8x - 3$$

rewrite! (dividing is multiplying by the reciprocal)

$$\frac{1}{y}(x) = 8x - 3$$

mult both sides by y

$$y\left(\frac{1}{y}\right)x = y(8x-3)$$

$$x = y(8x-3)$$

divide both sides by $(8x-3)$

$$\frac{x}{(8x-3)} = \frac{y(8x-3)}{(8x-3)}$$

$$\frac{x}{(8x-3)} = y$$